

A.(9) 1.(1) What unit factor would you use to convert km to nm? \_\_\_\_\_

2.(4) Make the following conversions giving answers in scientific notation.

a. 26.0 ps = \_\_\_\_\_ s    b. 0.0475 GL = \_\_\_\_\_ mL

3.(2) A small cube was found to 0.55 mm per side. What is its volume expressed in  $\mu\text{m}^3$ ? \_\_\_\_\_4.(2) You are working for a company and you run an experiment in which the temperature changes from 373 K to 330 K. The company wants the temperature **change** to be expressed in Fahrenheit degrees. What number would you present? \_\_\_\_\_  $^{\circ}\text{F}$ B. 1.(5) How many hydrogen atoms are present in 3.41 grams of  $(\text{NH}_4)_2\text{SO}_4$ ? \_\_\_\_\_ hydrogen atoms

2.(4) What mass of Ca (40g/mole) has the same number of atoms as 3.0 g of aluminum (27g/mole)? \_\_\_\_\_ g Ca

3.(5) A substance is composed of C, H, O and N and is 32.0 % C, 6.7 % H and 42.7 % O. (molar masses are 12.0 for C, 1.00 for H, 16.0 for O and 14.0 for N). What is the simplest formula for the substance?

C \_\_\_ H \_\_\_ O \_\_\_ N \_\_\_

C.(15) Give the Lewis structure for

1. a.  $\text{NI}_3$  \_\_\_\_\_    b.  $\text{SO}_2$  \_\_\_\_\_    c.  $\text{H}_2\text{S}$  \_\_\_\_\_

## 2. Matching

_____ electron orientation in $\text{NI}_3$	A. tetrahedral
_____ shape of $\text{NI}_3$ molecule	B. trigonal planar
_____ electron orientation in $\text{SO}_2$	C. trigonal pyramidal
_____ shape of $\text{SO}_2$ molecule	D. linear
_____ electron orientation in $\text{H}_2\text{S}$	E. bent
_____ shape of $\text{H}_2\text{S}$ molecule	F. octahedral

3. What are the bond angles in  $\text{NI}_3$ ? \_\_\_\_\_ in  $\text{SO}_2$ ? \_\_\_\_\_ in  $\text{H}_2\text{S}$  \_\_\_\_\_D.(19) Consider the balanced equation,  $\text{CS}_2$  (76) +  $3\text{O}_2$  (32)  $\Rightarrow$   $\text{CO}_2$  (44) +  $2\text{SO}_2$  (64)

1.(4) What is the oxidation number of the :

C in  $\text{CS}_2$ ? \_\_\_\_\_ S in  $\text{CS}_2$  \_\_\_\_\_ O in  $\text{O}_2$ ? \_\_\_\_\_ S in  $\text{SO}_2$  \_\_\_\_\_

2.(6) What substance is:

a. losing electrons? \_\_\_\_\_ b. being reduced? \_\_\_\_\_ c. the reducing agent? \_\_\_\_\_

3.(3) How many moles of  $\text{SO}_2$  can be formed from 0.15 moles of  $\text{O}_2$  and excess  $\text{CS}_2$ ? \_\_\_\_\_ moles  $\text{SO}_2$ 4.(6) In a given experiment, 7.6 g of  $\text{CS}_2$  and 6.4 g of  $\text{O}_2$  are allowed to react?

a. Which reagent is the limiting reagent? \_\_\_\_\_

b. How many grams of  $\text{SO}_2$  can be formed? \_\_\_\_\_ g  $\text{SO}_2$

E.(22) When choices are given, circle the best response.

1. When does a theory become a law? a. When it is proven. b. Never. c. When accepted by the scientific community.

2,3. A given species has 16 electrons, 15 protons and 17 neutrons.

- What is its atomic number? 15 16 17 31 32
- What is its mass number? 15 16 17 31 32
- Give the appropriate symbol for this species including any charge. \_\_\_\_\_
- Give the appropriate symbol for an isotope of this species. \_\_\_\_\_

4. What alkali metal is isoelectronic with sulfide ion?  $\text{Ca}^{2+}$   $\text{Na}^+$   $\text{Cl}^-$   $\text{K}^+$

5. Which is the smallest species? Si P Ge As

6. Which species has the lowest ionization energy? Na Mg K Ca

7. Which element is a gas at room conditions? B Kr C Br

8. The number of valence electrons in As is \_\_\_\_\_.

9. What is the formula for the ionic compound formed from aluminum and sulfur? \_\_\_\_\_

10. Which is the most polar bond? C-H C-O C-N C-S

11. Which is the most polar molecule?  $\text{CO}_2$   $\text{CH}_3\text{OH}$   $\text{CF}_4$   $\text{CH}_4$

F.(5) Excess  $\text{BaCl}_2$  is added to 25.0 mL of a sulfuric acid solution and the resulting  $\text{BaSO}_4$  (233 g/mole) weighed 1.356 g. What is the molarity of the sulfuric acid solution? \_\_\_\_\_M

G.(10) Circle those species which would appear as products in a net ionic equation when aqueous solutions of the following are mixed.

**Potential products**

- $\text{H}_2\text{S}$  and  $\text{KOH}$ :  $\text{K}^+$ ,  $\text{S}^{2-}$ ,  $\text{H}_2\text{O}$ ,  $\text{K}_2\text{S}$ , no reaction
- $\text{AgNO}_3$  and  $\text{AlI}_3$ :  $\text{Al}(\text{NO}_3)_3$ ,  $\text{Ag}^+$ ,  $\text{AgI}$ ,  $\text{Al}^{3+}$ , no reaction
- $\text{NH}_4\text{Br}$  and  $\text{NaOH}$ :  $\text{NaBr}$ ,  $\text{NH}_4^+$ ,  $\text{NH}_4\text{OH}$ ,  $\text{OH}^-$ , no reaction
- $\text{Na}_2\text{CO}_3$  and  $\text{HCl}$ :  $\text{CO}_2$ ,  $\text{Cl}^-$ ,  $\text{H}_2\text{O}$ ,  $\text{NaCl}$ , no reaction
- $\text{K}_2\text{SO}_4$  and  $\text{HCl}$ :  $\text{KCl}$ ,  $\text{K}^+$ ,  $\text{Cl}^-$ ,  $\text{H}_2\text{SO}_4$ , no reaction

H.(8) Name the following or give the formula, whichever is appropriate.  
aluminum phosphate \_\_\_\_\_ nitrous acid \_\_\_\_\_

$H_2S$  \_\_\_\_\_  $Sn(CO_3)_2$  \_\_\_\_\_

iron(III) hydroxide \_\_\_\_\_  $CCl_4$  \_\_\_\_\_

$HClO_4$  \_\_\_\_\_ potassium bicarbonate \_\_\_\_\_